PROGRAM MANAGER
RMA CONTAMINATION CLEANUP

U.S. ARMY
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— COMMITTED TO PROTECTION OF THE ENVIRONMENT —

Proposed Decision Document for the Interim Response Action at the Rocky Mountain Arsenal Hydrazine Blending and Storage Facility

July, 1988

Prepared for:

U.S. Army Program Manager's Office for
Rocky Mountain Arsenal Contamination Cleanup

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PROPOSED DECISION DOCUMENT
FOR THE INTERIM RESPONSE ACTION
AT THE ROCKY MOUNTAIN ARSENAL
HYDRAZINE BLENDING AND STORAGE FACILITY

July 1988

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Rocky Mountain Arsenal Contamination Cleanup

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THIS INTERIM RESPONSE ACTION WILL CONSIST OF 1) THE TREATMENT AND DISPOSAL OF WASTE PRODUCTS AND 2) DISPOSAL OF ALL STRUCTURES ASSOCIATED WITH THE HYDRAZINE BLENDING AND STORAGE FACILITY.

THIS PROPOSED DECISION DOCUMENT PROVIDES SUMMARIES OF:

1. ALTERNATIVES CONSIDERED
2. SIGNIFICANT EVENTS LEADING TO THE INITIATION OF THE IRA
3. THE IRA PROJECT
4. THE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS, STANDARDS, CRITERIA, AND LIMITATIONS (ARAR'S) ASSOCIATED WITH THE PROGRAM.

EITHER OZONE/UV OR HYDROGEN PEROXIDE/UV IS RECOMMENDED FOR TREATMENT OF WASTEWATER.

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1.0 INTRODUCTION

The Interim Response Action (IRA) at the Rocky Mountain Arsenal (RMA) Hydrazine Blending and Storage Facility (HBSF) is being conducted as part of the IRA process for RMA in accordance with the June 5, 1987 report to the court in United States V. Shell Oil Co. and the proposed Consent Decree.

This IRA project will consist of the treatment and disposal of pretreated liquids in tanks used for storage of waste products from the blending of rocket fuels; and the dismantlement and disposal of all remaining above ground structures associated with the HBSF.

2.0 HISTORY OF RMA HBSF

Rocky Mountain Arsenal occupies over 17,000 acres, approximately 27 square miles, of land in Adams County, directly northeast of metropolitan Denver, Colorado (see Figure 1). The HBSF, which is owned by the Air Force and was operated by RMA between 1962 and May 5, 1982 (Strang, 1982), is located east of the South Plants area in the northeast corner of Section 1 (see Figure 2). The site consists of two yards each completely surrounded by a chain-link security fence and a barbed-wire fence. The yards are connected by two overhead pipelines.

The west yard was constructed in 1961 and is approximately 346,000 square feet (ft^2) in area. The yard contains the loading and unloading facilities for rail cars and tank trucks; the blending facilities; a 44,000-gallon inground concrete tank for the collection of wastewaters and area runoff; a drum filling station; a drum storage pad; office, storage, and tool sheds; and two 19,000-gallon carbon steel and four 24,900-gallon stainless steel bulk storage tanks.

The east yard was constructed in 1976 as an additional storage facility for unsymmetrical dimethylhydrazine (UDMH). The east yard is approximately 103,000 ft^2 in area and contains one 50,000-gallon and one 200,000-gallon carbon steel storage tank.

Figure 3 illustrates the schematic layout of the HBSF. Table 1 lists the major equipment and structures located at the HBSF. In addition, the HBSF contains asbestos and polyurethane insulated piping, electrical equipment that may contain polychlorinated biphenyls (PCBs), and flammable liquids including ethylene glycol that was used as a heat transfer fluid in the storage tank heat exchanger units.

The HBSF has been used as a depot to receive, blend, store and distribute hydrazine fuels. The primary operation was the blending of anhydrous hydrazine and UDMH to produce Aerozine 50. The materials were manufactured elsewhere and shipped to RMA for blending. Blending operations were not continuous and occurred in response to requests by the Air Force. Other operations at the HBSF included loading and unloading rail cars and tank trucks; destruction of off-spec batches of Aerozine 50; and storage of Aerozine 50, anhydrous hydrazine, monomethyl hydrazine (MMH), monopropellent hydrazine, hydrazine 70, UDMH, and hydrazine.

Hydrazine and UDMH are ignitable, corrosive and toxic. They are unstable in the natural environment and rapidly decompose when exposed to the atmosphere. One of the decomposition products is n-nitrosodimethylamine (NDMA), a suspected carcinogen. From January through March 1982, OSHA surveyed the HBSF and detected the presence of airborne NDMA within the HBSF. In May 1982, RMA ceased operations and closed the HBSF to all but safety-essential or emergency-response entries.

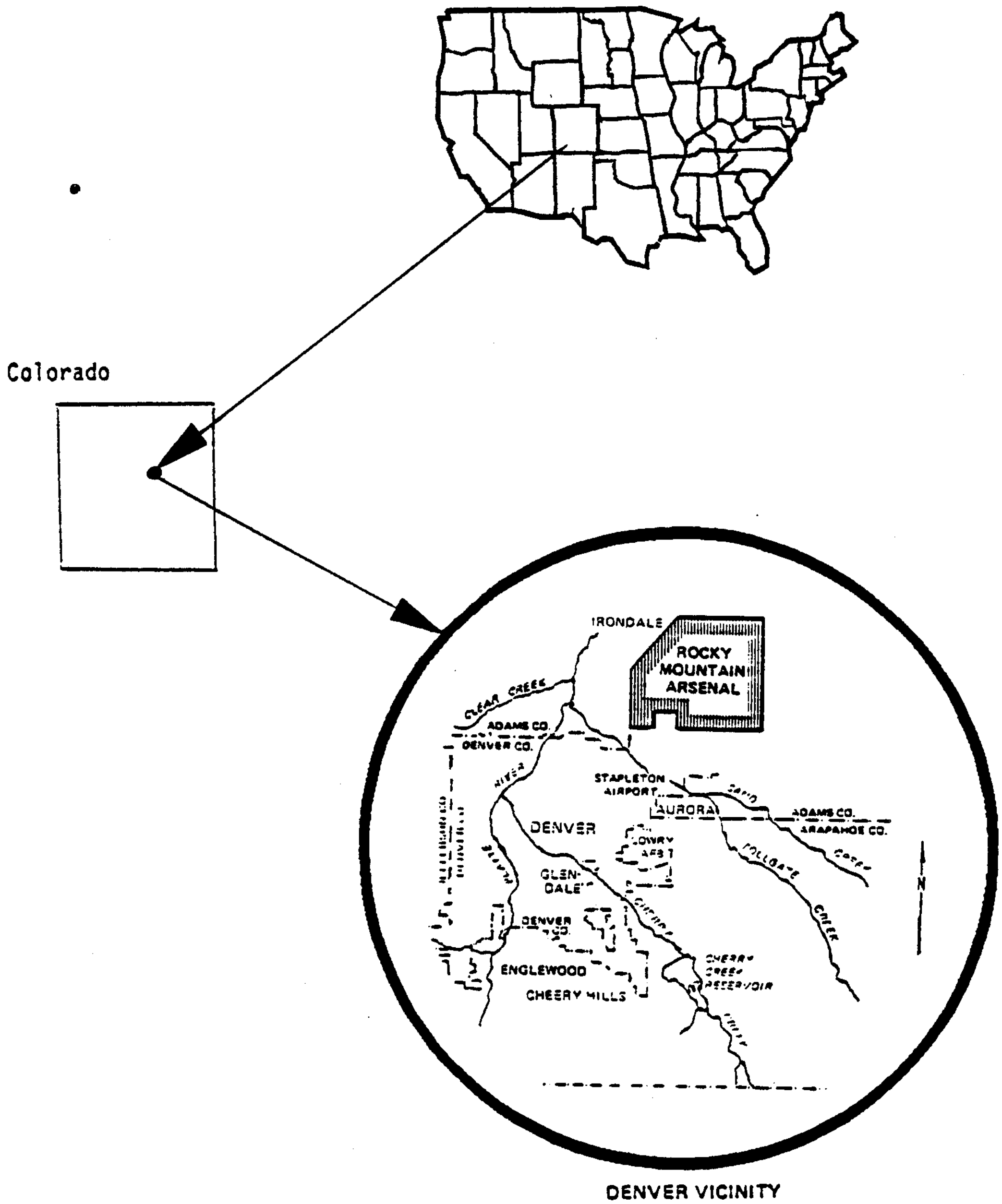

Figure 1. Installation Location Map

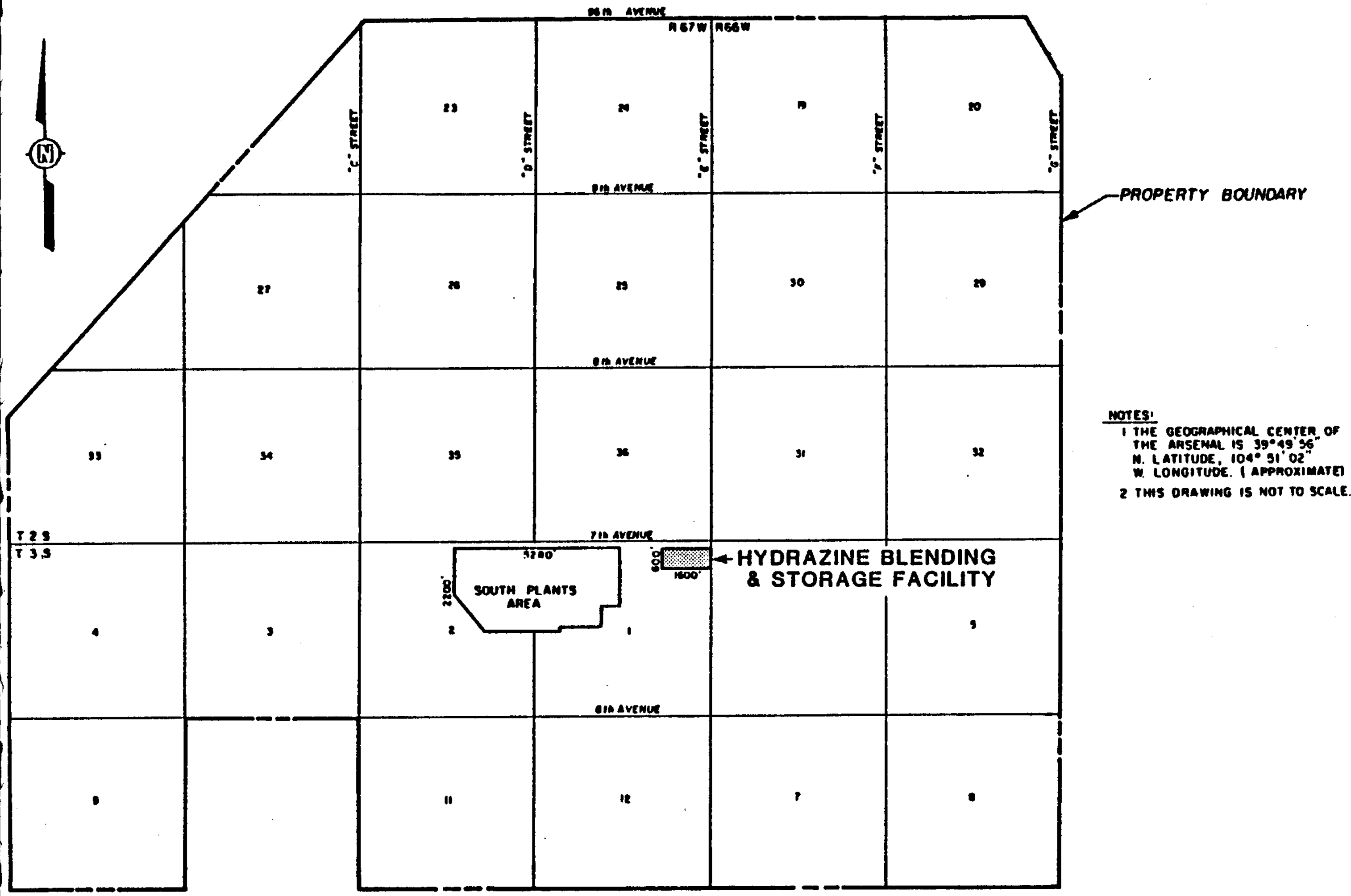

Figure 2. HBSF Location Map

Source: Draft Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment, Version 2.2, Ebasco Services Incorporated, April 1988.

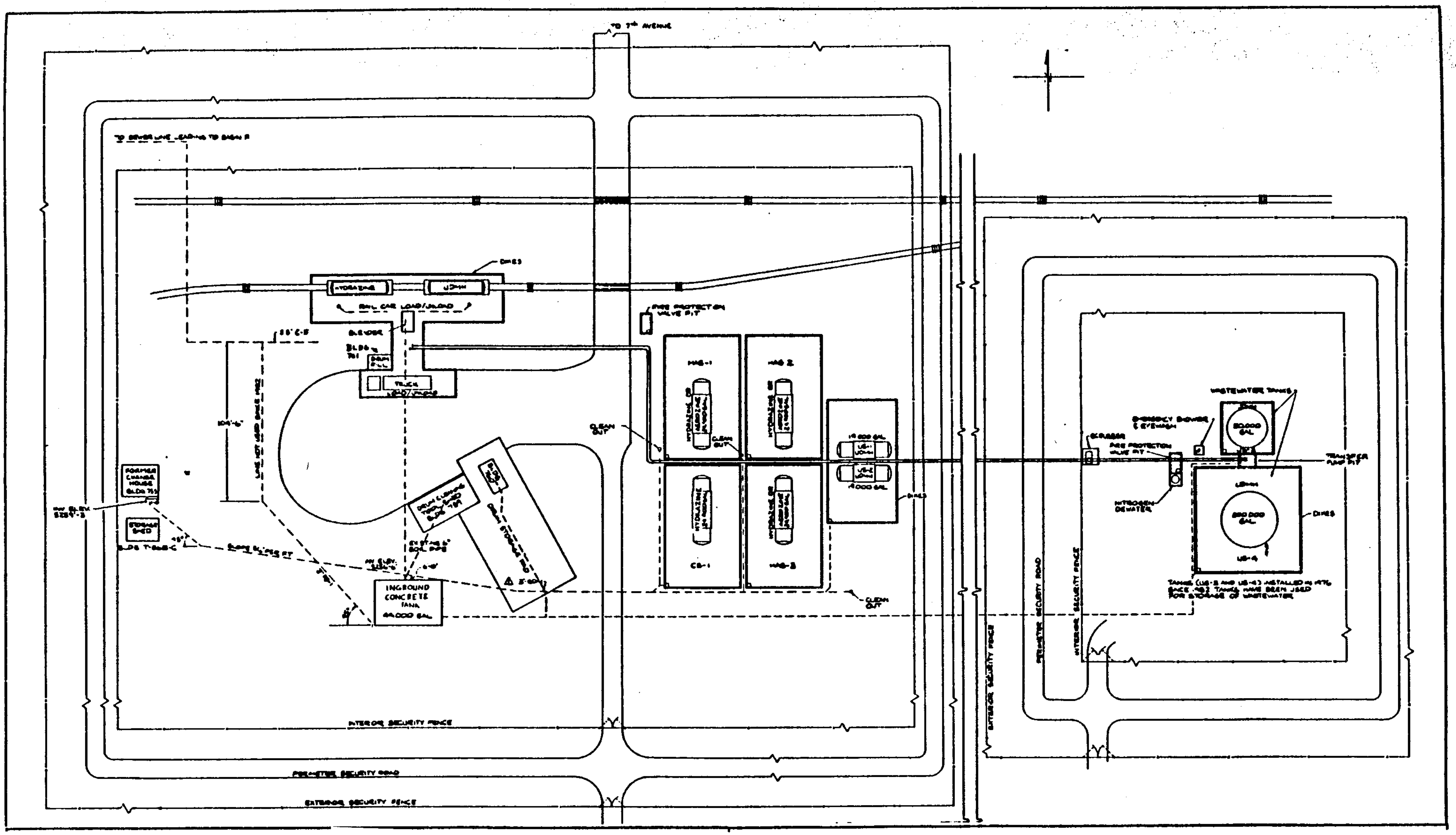

Figure 3. Schematic Layout of the HBSF

Source: Draft Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment, Version 2.2, Ebasco Services Incorporated, April 1988.

Table 1. Major Equipment and Structures Located at the Hydrazine Blending and Storage Facility

Item	Description
Railroad Tank Car Facility	
Enclosed Area	120'-0" x 30'-0"
Function	Unloading of anhydrous hydrazine and UDMH from railroad tanker cars
Construction Material	Reinforced concrete. Metal sheets.
Blender	
Function	Blend Hydrazine and UDMH to produce Aerozine 50
Construction Material	Reinforced concrete. Metal sheets.
Drum Loading Station (Bldg. 761)	
Area	22'-0" x 10'-0"
Function	Loading of Aerozine 50
Construction Material	Reinforced concrete
Truck Loading Station	
Area	60'-0" x 18'-0"
Function	Loading of Aerozine 50 into tanker trucks
Office Shed/Change House (Bldg. 755)	
Size	20'-0" x 24'-0" x 9'-0"
Function	Clothing change and showers (until late 1970's). Glycol recirculating pump and heat exchanger housing.
Construction Material	8" masonry (concrete block)
Inground Concrete Tank	
Area	40'-0" x 26'-0"
Volume	44,000 gallons
Function	Receive wastewater and stormwater runoff
Construction Material	Concrete
Building 759	
Size	40'-0" x 20'-0" x 10'-0"
Function	Drum cleaning
Construction Material	Metal siding/metal roofing

Source: Draft Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment, Version 2.2, Ebasco Services Incorporated, April 1988.

Table 1 (continued).

Item	Description
Shelter (Bldg. 760)	
Location	In drum storage area
Function	Forklift storage
Size	20'-0" x 10'-10"
Storage Shed (Bldg. T-686-C)	
Size	13'-6" x 22'-0" (estm.)
Function	Storage of miscellaneous building materials
Construction Material	Wood
Drum Storage Pad	
Size	70'-0" x 45'-0" x 6"
Function	Storage of drums
Aerozine Storage Tanks	
Number of Tanks	3 (HAS-1, HAS-2, HAS-3)
Geometric Shape	Cylindrical, Horizontal
Volume	24,900 gallons
Construction Material	Stainless steel
Location	Inside concrete dikes
Size of Dike	53'-6" x 47'-0" x 5'-0"
Anhydrous Hydrazine Storage Tank	
Number of Tanks	1 (CS-1)
Geometric Shape	Cylindrical, Horizontal
Volume	24,900 gallons
Construction Material	Stainless steel
Prior Use	Wastewater storage
Location	Inside concrete dike
Size of Dike	53'-6" x 47'-0" x 5'-0"
UDMH Storage Tanks	
Number of Tanks	2 (US-1, US-2)
Geometric Shape	Cylindrical, Horizontal
Volume	19,000 gallons
Construction Material	Carbon steel
Location	Inside concrete dike
Size of Dike	43'-0" x 77'-0" x 5'-0"

Table 1 (continued).

Item	Description
Wastewater Tanks	
Number of Tanks	2 (US-3, US-4)
Geometric Shape	Cylindrical, Vertical
Volume	50,000 gallons and 200,000 gallons
Construction Material	Carbon steel
Prior Use	UDMH storage
Pumps	
Number	6 (HWP-1, HWP-2, UP-1, HAP-1, CP-1, FDP-1)
Liquids	Hot water, wastewater, UDMH, hydrazine, aerozine, contaminants.
Pipes (Above Ground)	
Diameter	2.5"
Number	18 (U-1, U-2, U-3, U-4, HA-1, HA-2, HA-3, HA-4, HA-5, A-1, A-2, H-1, H-2, C-1, C-2, C-3, C-4, C-5)
Diameter	3.0"
Number	2 (HWR-1, HWS-2)
Diameter	4.5"
Number	1 (V-1)
Scrubbers	
Number	2
Location	One at blender area, one at wastewater tank area.
Fire Protection Valve Pit	
Number	2
Location	One near hydrazine/aerozine tank area, one near wastewater tank area.

On February 1, 1988, a proposed Consent Decree was lodged in the case of U.S. v. Shell Oil Company with the U.S. District Court in Denver, Colorado. The Army and Shell Oil Company agreed to share costs of the cleanup that was to be developed and performed under the oversight of the EPA, with numerous opportunities for comment by the State of Colorado. The long term cleanup is is a complex task that will take several years to complete. To facilitate more immediate remediation activities, the Consent Decree specifies a number of interim actions to alleviate the most urgent problems. One of these interim actions is at the HBSF.

3.0 INTERIM RESPONSE ACTION OBJECTIVES

The objectives of the HBSF IRA are to meet the following specific criteria:

- Treat wastewater to levels that will effectively eliminate any substantial risks to human health and the environment associated with the contaminants of concern including hydrazine, MMH, UDMH, and NDMA.
- Use treatment technology that is technically feasible and readily implementable.
- Achieve permanent remediation through destruction of contaminants of concern to designated action levels or reduce the toxicity, mobility, and volume of wastewater.
- Minimize cost.
- Comply with designated Applicable or Relevant and Appropriate Requirements.

This decision document provides a summary of the alternatives considered, a chronology of the significant events leading to the initiation of the IRA, a summary of the IRA project, and a summary of the Applicable or Relevant and Appropriate Requirements, standards, criteria, or limitations (ARARs) associated with the program.

4.0 INTERIM RESPONSE ACTION ALTERNATIVES

Wastewater treatment alternatives were examined in the April, 1988 Draft Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment (Ebasco Services Incorporated, 1988), prepared for the Office of the Program Manager for the Contamination Cleanup of Rocky Mountain Arsenal.

The No Action alternative was quickly dismissed as unacceptable. Approximately 270,000 gallons of wastewater are currently stored in various tanks at the HBSF. The storage of wastewater is the suspected cause of trace levels of NDMA in the air. The No Action alternative would not provide any remediation of the HBSF, nor would it result in reduced levels of NDMA.

The following 17 wastewater treatment alternatives were considered:

- Biological Treatment
  - On-Site Biological Treatment
  - Discharge to a Publically Owned Treatment Works

- Chemical Treatment
  - Chlorination
  - Chlorination/Ultraviolet (UV) Light
  - Ozonation
  - Ozone/UV Light
  - Permanganate
  - Hydrogen Peroxide and Hydrogen Peroxide/UV Light
  - Reduction Processes

- Physical Treatment
  - Activated Carbon Adsorption
  - Metal Oxide Adsorption/Catalysis
  - Evaporation Pond
  - Air Stripping
  - Steam Stripping
  - Spray Irrigation

- Thermal Treatment
  - Off-Site Incineration
  - On-Site Incineration

Table 2 summarizes the initial screening of the wastewater treatment alternatives. Eleven of the treatment alternatives, identified as being either unable to efficiently remove the contaminants without producing hazardous by-products requiring supplemental treatment or in need of substantial development in order to evaluate treatment efficiency and implement the process, were eliminated early in the evaluation process. These alternatives are summarized in Table 3.

Table 2. Summary of Initial Wastewater Treatment Alternatives Screening

Wastewater Treatment Alternative	Effective Destruction of Hydrazine Related Compounds	Rapid and Simple Implementation	Non-Hazardous By-Products and End Products
On-Site Biological Treatment	Uncertain	Yes	Uncertain
Discharge to a POTW	Uncertain	Yes	Uncertain
Chlorination	Yes	Yes	No
Chlorination/UV	Yes	Yes	Yes
Ozonation	Yes	Yes	Yes
Ozone/UV	Yes	Yes	Yes
Permanganate	Uncertain	No	Uncertain
Hydrogen Peroxide	Uncertain	Yes	Uncertain
Hydrogen Peroxide/UV	Highly Probable	Yes	Yes
Reduction Processes	Yes	No	No
Activated Carbon Adsorption	No	Yes	No
Metal Oxide Adsorption Catalysis	No	No	No
Evaporation Pond	Highly Probable	Yes	Likely; potential residues easily disposed
Air Stripping or Steam Stripping	No	Yes	No
Spray Irrigation	Uncertain	Yes	Uncertain
Incineration	Yes	Yes	Yes

Source: Draft Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment, Version 2.2, Ebasco Services Incorporated, April 1988.

Table 3. Summary of Eliminated Alternatives

Alternative	Description	Reason For Elimination	Corroborating Study
On-Site Biological Treatment	Decomposition of a substance by microorganisms (bacteria) at a RMA facility.	Undiluted HBSF wastewater contaminant concentrations generally exceed levels identified as reducing metabolic rates and would inhibit or destroy bacterial activity.	Kane and Williamson, 1980
		NDMA found to be nonbiodegradable.	Tate and Alexander, 1975, 1976
Discharge to a Publically Owned Treatment Works	Decomposition of a substance by microorganisms (bacteria) at a publically owned treatment works.	Wastewater can be diluted to virtually any level, but dilution does not ensure degradation will occur.	Kane and Williamson, 1980
		NDMA found to be nonbiodegradable.	Tate and Alexander, 1975, 1976
Chlorination	Chlorine, an oxidizing agent, supports combustion of a substance by supplying oxygen.	Oxidization by chlorine can destroy hydrazine and related compounds, but is often incomplete and produces undesirable chlorinated by-products that would require additional treatment.	Brubaker et al., 1985 Castegnaro et al., 1986 Neumann and Jody, 1986
Permanganate	Permanganate, a common, strong, oxidizing agent, supports combustion of a substance by supplying oxygen.	Unconfirmed effectiveness in degrading NDMA. Manganous oxide solid, a permanganate reduction product, would require disposal.	Castegnaro et al., 1986

Table 3 (continued).

Alternative	Description	Reason For Elimination	Corroborating Study
Reduction Processes	Chemical process in which the loss of electrons from a substance (reducing agent) results in the conversion of a hydrazine related compound to its corresponding amine which may be more easily handled and disposed.	Process successfully reduced hydrazine, MMH, UDMH and NDMA, but has not been developed beyond laboratory stage. Reduction of NDMA and UDMH generates dimethylamine, a hazardous substance by-product that would require subsequent treatment.	Lunn et al., 1983 a, b
Activated Carbon Adsorption	Adherence of molecules of hydrazine and related compounds to the surface of carbon "activated" by heating to 800-900°C with steam or carbon dioxide.	NDMA, MMH, and UDMH poorly adsorbed onto activated carbon due to low moleculer weight and chemical structure.	EPA, 1979
Metal Oxide Adsorption/ Catalysis	Adherence of molecules of hydrazine and related compounds to the surface of metal oxides. Metal oxide surface may cause the loosening of chemical bonds between substances and accelerate the rate of hydrazine related compound destruction.	Adsorption of NDMA onto metal oxides has not been well studied and removal efficiency is uncertain. Adsorption onto metal oxides transfers hydrazine compounds to different media (liquid to solid) rather than destroys them.	Hayes et al., 1982 Braun and Zirroli, 1983 Heck et al., 1963

Table 3 (continued).

Alternative	Description	Reason For Elimination	Corroborating Study
Air Stripping	Process in which volatile hydrazine and related compounds in water or soil are transferred to gas.	Air stripping transfers contaminants from water to air rather than destroys them. Inefficient separation of hydrazine from water into vapor.	Wilson et al., 1955
Steam Stripping	Process in which hydrazine contaminated wastewater is heated to approximately 140°F and volatile compounds are transferred to gas.	Steam stripping transfers contaminants from water to air rather than destroys them. Inefficient separation of hydrazine from water into vapor.	Wilson et al., 1955
Spray Irrigation	Spraying of wastewater onto soil and subsequent adsorption by soils, oxidization by air, and degradation by sunlight and microorganisms (bacteria).	If technology failed, potential groundwater contamination could endanger human health and the environment.	Ebasco Services Incorporated, 1986
On-Site Incineration	Combustion of hydrazine contaminated wastewater at temperatures from 1200-1500°C in on-site or mobile incinerator.	Existing RMA North Plants Incinerator is inadequate for assured destruction of hydrazine compounds. Use of mobile incinerators or construction of new on-site incinerator would require test burns and possible mobilization or construction delays.	Tillman, 1986

The following six alternatives, initially identified as meeting treatment efficiency and implementation requirements, were further studied:

- o Chlorination/UV light,
- o Ozonation,
- o Evaporation pond,
- o Off-site incineration,
- o Ozone/UV light, and
- o Hydrogen peroxide/UV light.

Chlorination/UV Light: This alternative consists of a recirculating or batch wastewater system incorporating chlorine contact and subsequent oxidation followed by ultraviolet light exposure. Implementation of chlorination/UV light would require installation of a chlorine dispensing system and a UV contact chamber along with the associated monitoring equipment and piping and possibly a sulfite dispensing unit. A moderate amount of effort and time would be required to install the equipment assuming personal protection is required. Alternatively, the use of a mobile treatment unit would only require hook-up to the existing piping or tanks.

Chlorination can effectively destroy NDMA, hydrazine, MMH, and UDMH. However, miscellaneous by-products are produced that require subsequent treatment. UV light applied in conjunction with chlorination aids in the destruction of the contaminants and by-products (Fochtman and Koch, 1979 and Prengle et al., 1976); however, the time required may be extensive, treatability studies would be required, and additional treatment of the chlorinated by-products may still be required. For these reasons, the chlorination/UV light alternative was not considered as a final alternative.

Ozonation: This alternative consists of on-site generation of ozone and its introduction either into a recirculating flow of wastewater through existing piping or directly into the tanks and sump. Alternatively, a mobile treatment system may be used. Venting, scrubbing, and possibly recycling of off-gases could be necessary to release reaction products and recover oxygen. A pH monitoring and control system may be necessary. Treatment would be continued until the wastewater meets concentration requirements, after which the water would be discharged.

Ozonation effectively destroys hydrazine, MMH, and UDMH through oxidation to concentrations below detection limits. Oxidation of UDMH produces NDMA which can be destroyed by continued ozonation. Miscellaneous side-products produced during the reactions are also oxidized, in time, to innocuous end-products. In addition, Prengle et al. (1976) demonstrated that ozonation aids in the destruction of chloroform and other chlorinated compounds that are present in the wastewater from past decontamination practices using chlorination. Only minor treatability studies would be required to determine the effectiveness of ozonation on the actual wastewater as ozonation has already been tested on simulated hydrazine wastewaters. Hazards associated with ozone can be avoided with proper preventive measures. Installation complexity and time requirements would be minor, because of the utilization of existing tanks and piping and the simplicity of the operation. A mobile treatment system would be even simpler and require less time to implement.

However, ozonation was excluded as a final alternative in favor of ozone/UV light which differs from ozonation only by the addition of a UV light chamber or lamps, yet provides enhanced treatment and accelerates NDMA destruction, the treatment rate limiting factor.

Evaporation Pond: This final alternative involves construction of a lined pond according to substantive RCRA requirements or modification of existing containment structures to create a pond. HBSF wastewater, pre-treated with hydrogen peroxide solution to oxidize the hydrazine compounds, would be pumped from storage tanks into the pond. Natural degradation processes (oxidation and photolysis) would destroy the hydrazine compounds, and any NDMA formed by the oxidation of UDMH, while the water evaporated. Air monitoring devices would be placed around the pond to measure fugitive contaminant releases and a chain-link fence would surround the pond to restrict access. Treatment would continue until the water was completely evaporated, after which the pond would be decommissioned and the residues and liner disposed in a approved hazardous waste landfill.

The evaporation pond alternative can effectively treat contaminants and dispose of the water resulting in permanent remediation. Construction and implementation are simple, rapid, and safe. Overall time required for construction, operation, decommissioning, and site restoration is estimated to be 7 to 14 months. Following construction and filling of the pond, treatment can proceed without operator assistance or use of mechanical equipment. Costs are comparable to the ozone/UV light and hydrogen peroxide/UV light alternatives. Drawbacks of this alternative are that air monitoring must be conducted to ensure NDMA emission from UDMH oxidation does not exceed destruction by photolysis; limited data exists on the treatment effectiveness of NDMA photolysis in an evaporation pond; and weather variations and air monitoring requirements may cause treatment and decommissioning delays.

Off-Site Incineration: Wastewater would be pumped into rail tank cars or tanker trucks and transported to a RCRA approved incineration facility. Approximately 41 7,500- allon tanker trucks or 21 15,000-gallon rail cars would be needed to transport the wastewater. At least two facilities, SCA in Chicago, Illinois and Rollins in Deer Park, Texas currently have the capacity, capability and availability to incinerate the wastewater.

Incineration technologies are well-established, assure virtually complete, permanent destruction of the contaminants, and can be simply, rapidly, and safely implemented. Implementation of the process would only involve a test burn and chemical analysis of the wastewater, pumping wastewater into tanker trucks or rail cars, and transport to the incinerator locations. Approximately 8 to 13 weeks would be necessary to load, transport, and incinerate the wastewater. Minor hazards associated with handling and transport can be controlled using preventive measures. However, the cost of off-site incineration is approximately three times more than the other final alternatives.

Ozone/UV Light: This alternative is similar to the ozonation alternative. An on-site mobile treatment system, shown in Figure 4, would be used for recirculating water, ozone generation, initial ozone contact, pH control, and venting of off-gases. UV light exposure would follow ozonation. The wastewater may be acidified prior to treatment to improve the treatment efficiency. Treated acidic water would be neutralized, sampled and analyzed, then discharged to RMA's sanitary sewer system if action levels are attained.

Ozonation in conjunction with UV light has been found through research (Neumann and Jody, 1986), pilot scale and treatability studies, and demonstration to very effectively and permanently destroy hydrazine compounds and NDMA to below their detection limits. Operation and maintenance requirements would be moderate consisting of sampling, analysis, and equipment inspections and servicing. The system could be easily and rapidly implemented. Mobile units would be brought to the site so that no construction or design is required. It is estimated that treatment of the existing wastewater would require approximately 6 months. Safety concerns related to potential exposures to contaminated water, releases of ozone, high voltage, and handling and transport of liquid oxygen can be controlled using preventive measures. Costs are comparable to the evaporation pond and hydrogen peroxide/UV light alternatives. Minor drawbacks in implementability include potential for remobilization due to weather restrictions, and delays in decommissioning of the tanks while wastewater generated during facility decommissioning activities and stored in the tanks is treated.

Hydrogen Peroxide/UV Light: This alternative is similar to the ozone/UV light process, except that hydrogen peroxide would be substituted for gaseous ozone. A mobile treatment system, shown in Figure 5, would be used to feed concentrated hydrogen peroxide solution to the reactor from a storage tank. UV lamps within the reactor would activate the contaminants to aid in their destruction, and cleave the hydrogen peroxide to form hydroxyl species which oxidize the contaminants to action levels. Successfully treated water would be sampled and analyzed, pH adjusted if acidic, and discharged to RMA's sanitary sewer system, if found clean. Hydrogen peroxide, when used alone destroyed NDMA with an efficiency of about 60 percent (Castegnaro and Walker, 1976). However, combined with UV light hydrogen peroxide has been demonstrated (Sundstrom and Klei, 1983) to have a much greater destruction efficiency and rate than peroxide alone. Although not demonstrated in field applications, the mechanism of action of hydrogen peroxide/UV light is similar to ozone/UV light, with ozone a somewhat stronger oxidizing agent than hydrogen peroxide. Treatability studies have indicated that the process provides essentially equivalent treatment to ozone/UV light under proper conditions. By-products can be destroyed to any desired level and the contaminants of concern are permanently destroyed. The process may be easily and readily implemented. Initially, adjustments to chemical feed and flow rates would be necessary to establish efficient operating conditions. Later, the process can be automated for continuous use. Daily inspections and periodic refilling of the hydrogen peroxide tanks would be necessary; otherwise, the process would require little servicing. The mobile system is easily set-up and requires no construction or design. Treatment of the

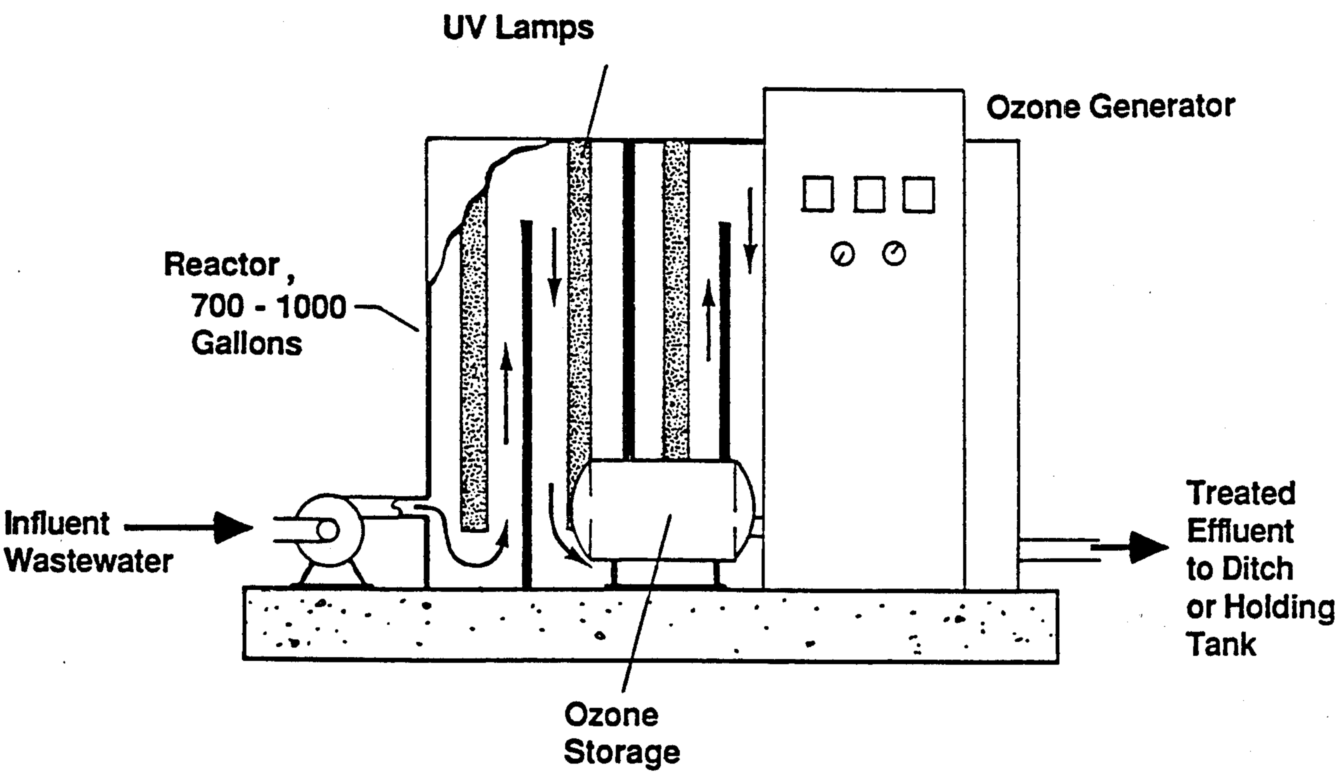

Figure 4. Ozone/UV Light On-Site Mobile Treatment System

Source: Draft Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment, Version 2.2, Ebasco Services Incorporated, April 1988.

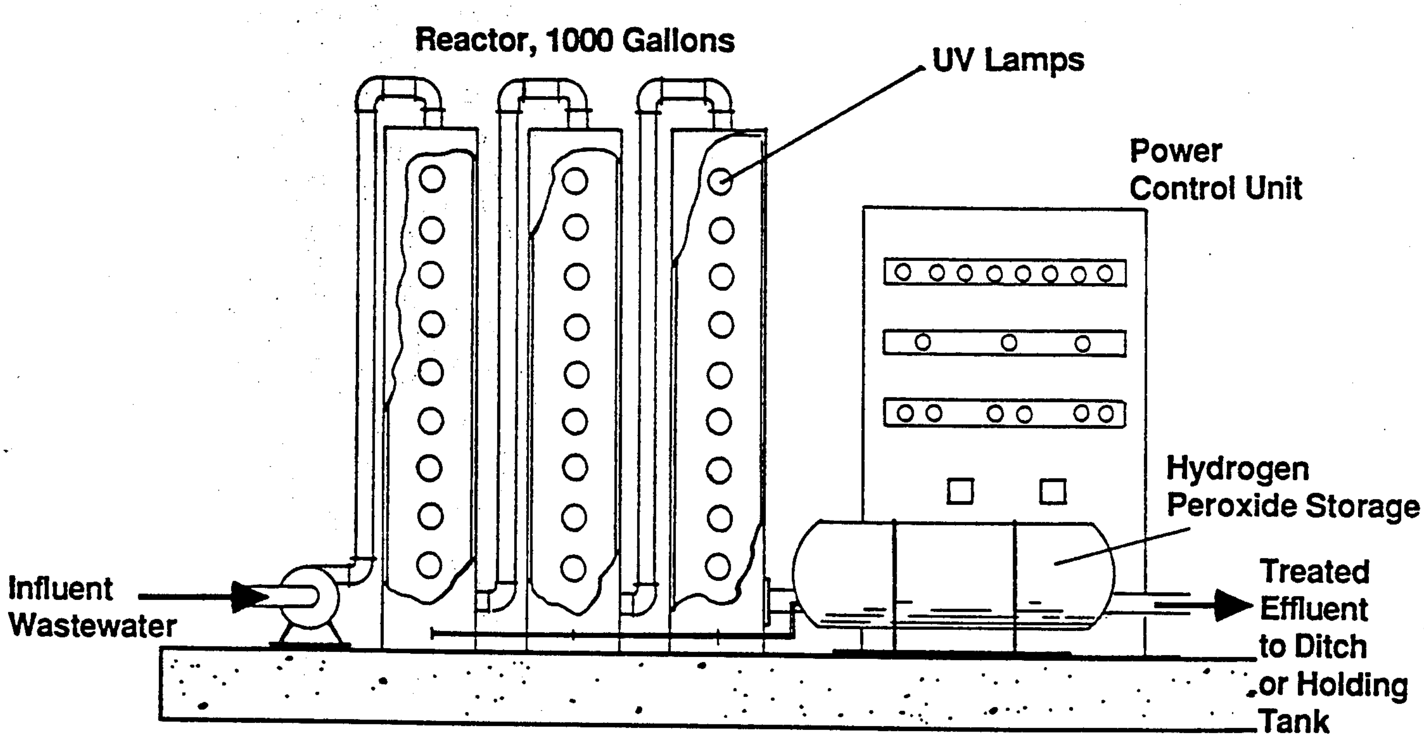

Figure 5. Hydrogen Peroxide/UV Light On-Site Mobile Treatment System

Source: Draft Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment, Version 2.2, Ebasco Services Incorporated, April 1988.

existing wastewater is estimated to take 6 months. Operation of the hydrogen peroxide/UV light system involves hazards associated with exposure to contaminated water and concentrated hydrogen peroxide. However, preventive measures and appropriate use of health and safety equipment can control these hazards, and the containment of the wastewater in a closed system reduces the likelihood of potential exposures. In addition, hydrogen peroxide is generally easier to handle than ozone and has fewer safety complications. Costs are comparable to ozone/UV light and evaporation pond alternatives. Partial delay in decommissioning due to the treatment of wastewater generated during facility decommissioning activities and stored in the tanks, and remobilization to treat additional wastewater or meet weather restrictions are drawbacks to implementability.

Table 4 summarizes the secondary screening of the wastewater treatment alternatives. Table 5 summarizes the final wastewater treatment alternatives. The recommendation of the preferred alternative is based on issues of technical feasibility and cost, since all alternatives are capable of achieving the goal of permanent cleanup. All the final alternatives provide very good protection of human health and the environment.

The evaporation pond has some practical advantages, but limited performance data, and the potential for delayed decommissioning of the site due to weather variations and air quality concerns hinder its applicability. The remaining three alternatives are similarly feasible, but cost of the off-site incineration alternative is approximately three times that of the ozone/UV light or hydrogen peroxide/UV light alternatives.

The effectiveness of ozone/UV light and hydrogen peroxide/UV light has been demonstrated in treatability studies using HBSF wastewater. Because technical feasibility and treatment costs are similar, either ozone/UV light or hydrogen peroxide/UV light are recommended for treating the HBSF wastewater. The final selection between the two alternatives should be based upon more detailed engineering designs and cost estimates. Both systems are capable of destroying the contaminants to below detectable levels, ensuring permanent treatment and protecting human health and the environment. Potential problems associated with the discharge of treated wastewater could be overcome by analyzing the wastewater and documenting treatment effectiveness.

Table 4. Summary of Secondary Wastewater Treatment Alternatives Screening

Wastewater Treatment Alternative	Criteria Treatment Efficiency
Chlorination/UV Light	Chlorinated intermediates formed which may not be rapidly or completely destroyed.
Ozonation	Destruction of hydrazine related compounds assured, but destruction of intermediates may be slow or incomplete.
Ozone/UV Light	Destruction of hydrazine compounds and intermediates assured; process is simple.
Hydrogen Peroxide/UV Light	Destruction of hydrazine compounds and intermediates highly probable; ease of implemention improved over ozone/UV light.
Evaporation Pond	Destruction of hydrazine related compounds highly probable; process is easily implemented; potential hazardous residues easily disposed.
Off-Site Incineration	Assured destruction of all contaminants and rapid implementation.

Source: Draft Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment, Version 2.2, Ebasco Services Incorporated, April 1988.

Table 5. Summary of Final Wastewater Treatment Alternatives

Final Wastewater Treatment Alternative	Technical Feasibility	Permanence of Remedy	Human Health and Environmental Impacts	Relative Cost
Ozone/UV Light	High	High	High	Comparable to Other Alternatives
Hydrogen Peroxide/UV Light	High	High	High	Comparable to Other Alternatives
Evaporation Pond	Moderate	High	High	Comparable to Other Alternatives
Off-Site Incineration	High	High	High	Three Times Cost of Other Alternatives

Source: Draft Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment, Version 2.2, Ebasco Services Incorporated, April 1988.

5.0 CHRONOLOGY OF EVENTS

Date	Event
20 September 1982	Director of Energy Management, San Antonio Air Logistics Center, Kelly AFB verbally notified RMA that hydrazine mission would be phased out, and that plan was to blend and remove all product on-hand as soon as possible.
December 1982	Memorandum of Agreement (MOA) entered into between Colorado Department of Health, U.S. Environmental Protection Agency, Shell Chemical Company, and the Army to initiate a cooperative development plan for a comprehensive remedy for the environmental situation at RMA.
7-17 December 1982	Army Environmental Hygiene Agency conducted sampling program to quantify worker exposures to NDMA, UDMH and hydrazine. Industrial Hygiene Special Study No. 55-35-0125-83 Evaluation of Potential Exposures completed by AEHA; concluded NDMA present as air contaminant, no sources of detectable quantities of hydrazine or UDMH contamination identified by air sampling.
30 December 1982	Phase I Hazard Abatement tasks substantially completed. Included installation of modified trailer to be used as Personal Decontamination Station, procurement of special respirator equipment, decontamination of blender area and inground concrete wastewater tank, award of contract for NDMA analytical lab, and design engineering for process modifications.
January 1983	AEHA air sampling indicated NDMA still present in facility (maximum of 20 ug/m^3).
April 1983	During second quarter FY83 RMA conducted intensive effort to detect and repair UDMH leaks in the fuel system. Two rounds of testing and repairing were accomplished; however, area air sampling conducted after second round still indicated presence of NDMA.
5-6 May 1983	At meeting between Air Force and Army, it was agreed that best approach to eliminate presence of NDMA was to remove all fuel and decontaminate facility.

Date	Event
August 1983	Dames and Moore conducted presurvey of HBSF facility under contract to provide recommendations on how to proceed with closure of facility.
April 1984	Revised Presurvey Report completed by Dames and Moore and received by Air Force.
October 1985	Task 11 Damage Assessment Report submitted by Ebasco.
End of April 1986	Last of hydrazine removed from HBSF and shipped to a permitted off-site disposal facility.
25 June 1986	Memorandum of Understanding established between PM-RMA and Headquarters, Air Force Logistics Command (HQ AFLC) deliniating management, technical, and financial responsibilities for the Air Force and Army with respect to decommissioning the HBSF.
1 February 1988	Proposed Consent Decree lodged in the U.S. v. Shell Oil Company with the U.S. District Court in Denver, Colorado. The Consent Decree specified a number of interim actions, including closure of the HBSF, to facilitate remediation activities.
April 1988	Department of the Army's Preliminary ARAR Selection and Determination of ARAR Impact for HBSF Interim Response Action, completed by Department of Justice, specified applicable or relevant and appropriate Federal or State standards, requirements, limitations and criteria that the HBSF IRA must comply with.
April 1988	Draft Final Report, HBSF Wastewater Treatment and Decommissioning Assessment, Version 2.2 completed by Ebasco; concluded chemical oxidation using ozone or hydrogen peroxide combined with ultraviolet light exposure was preferred wastewater treatment alternative; and described five major activities comprising HBSF decommissioning process.

5.1 COORDINATION WITH THE PARTIES AND THE STATE

The U.S. Environmental Protection Agency, Shell Oil Company and the State of Colorado have received copies of the HBSF reports.

6.0 SUMMARY OF THE INTERIM RESPONSE ACTION PROJECT

The HBSF Interim Response Action will involve:

1. Treatment of hydrazine wastewaters and precipitation runoff stored in the 44,000 gallon inground concrete tank and tanks US-3 and US-4, and treatment of wastewater generated during the IRA to identified action levels. The preferred method of treatment is ozone/UV light or hydrogen peroxide/UV light using a mobile treatment system. Treatment of the wastewater will take place in tanks U-3 and U-4 and the inground concrete tank. After initial treatment, wastewater will be circulated through an ultraviolet light chamber to accelerate the oxidation of hydrazine, NDMA, MMH and UDMH. Following treatment of the contaminants to identified action levels, neutralized wastewater will be discharged to RMA's sanitary sewer system. Treatment system equipment will be removed and decontaminated, if necessary, upon completion of the IRA.

2. Removal of containerized PCB contaminated oil and transformers. All transformers at the HBSF will be treated as PCB contaminated. PCB contaminated transformer oil will be containerized and transported to an approved off-site incineration facility. The flushed transformer housings will be disposed of at an approved off-site landfill in accordance with regulations promulgated under the Toxic Substances Control Act (15 U.S.C. Section 2601 et seq.).

3. Removal of containerized flammable liquids and ethylene glycol. Uncontaminated material suitable for reuse and therefore not subject to hazardous waste regulation (40 C.F.R. Section 261.3(e)(ii)), will be removed prior to demolition. Contaminated material will be containerized and removed to an approved off-site incineration facility.

4. Asbestos removal. Friable asbestos will be removed using dry removal techniques due to the presence of hydrazine or NDMA, containerized, and transported to an approved off-site disposal facility in conformance with the requirements of 40 C.F.R. Part 61, Subpart M prior to the demolition of HBSF structures. This removal technique will be demonstrated to EPA Region VIII personnel prior to implementation.

The HBSF IRA hazard reduction plan calls for the removal of hazardous substances, pollutants, and contaminants from the site prior to demolition of the facility. Therefore, neutralization of the wastewater, removal of flammable liquids, and removal of asbestos insulation will be the initial focus of the IRA.

Removal of the PCB contaminated transformers will be delayed until there is no further need for access to electrical power at the HBSF. When hazards associated with these substances have been minimized, facility demolition will proceed.

5. Demolition of above ground HBSF structures will include removal of sheds, tanks, pads, berms, dikes, utility conduits, product transport piping, fences, railroad track and ties, and uploading/downloading truck and railcar stations. Table 6 lists the 36 tasks comprising the dismantling and demolition plan. Compacted demolition debris, which for the purposes of this IRA are assumed to be contaminated, will be removed to an approved off-site disposal facility.

6. Portions of the surface of the HBSF effected by facility demolition activities will be recontoured and revegetated at the conclusion of demolition activities.

6.1 HEALTH AND SAFETY PLAN

The contractor will be responsible for developing a site specific Health and Safety Plan (HASP) which will ensure the protection of the health and safety of employees, visitors, RMA officials and other contractors on the site. The HASP will also ensure compliance with all State, Federal, and U.S. Army occupational health and safety regulations. The HASP will be developed incorporating the guidance provided by EPA's Standard Operating Safety Guides for hazardous waste site activities (EPA, 1984). The format for the HASP must follow the format of the Health and Safety Plan for Rocky Mountain Arsenal (Ebasco Services Incorporated, 1985; Ebasco Services Incorporated, January 1986).

The HASP will require an assessment of the hazards posed by the conditions of the site and the activities of the decommissioning plan. These hazards will be addressed in a manner which allows for the efficient implementation of the decommissioning and at the same time protects the health of those people involved. All activities within the exclusion zone will require at least level B protection until it is clearly demonstrated that another level of protection is acceptable. Samples from the air and other media may be analyzed after the hazard reduction activities are complete to determine if the level B protection requirement may be downgraded. Samples will also be analyzed after decommissioning and restoration to determine if risks remain from NDMA or other hazardous material exposures.

Table 6. Dismantling and Demolition Plan Tasks

1. Demolish Building 760 leaving the floor slab which will be removed with the nonseverable equipment.

2. Demolish Building 759 leaving the floor slab which will be removed with the nonseverable equipment.

3. Demolish piping and 8 stanchions between Buildings 759 and 755. Stanchions will be cut at ground level and their footings removed. Remove and crush drums located near the truck turnaround.

4. Demolish Building 868 leaving the floor slab which will be removed with the nonseverable equipment.

5. Demolish piping and 5 stanchions between the west fence and Building 755. Stanchions will be cut at ground level and the footings removed.

6. Demolish Building 755 leaving the floor slab which will be removed with the nonseverable equipment including disposal of miscellaneous debris located inside the building.

7. Demolish piping and the 16 stanchions between Building 755 and the hydrazine loading area. Stanchions will be cut at ground level and their footings removed.

8. Demolish fire protection piping and 12 support stanchions located over the railroad loading facility. Support stanchions are bolted to a concrete slab and, hence, do not have foundations.

9. Demolish miscellaneous equipment in the hydrazine blender area including the blender, scrubber, drum filler, loading arms, and surrounding miscellaneous debris.

10. Demolish the railroad loading and truck loading platforms in the hydrazine blender area.

11. Demolish piping and 28 support stanchions between the hydrazine blender and the horizontal storage tanks including removal of stairs, handrails and metal grating attached to the stanchions. Stanchions are bolted to concrete foundations which will also be removed.

12. Demolish horizontal storage tank HAS-1. This includes removal of the fire deluge sprinkler system and stripping the insulation.

Source: Draft Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment, Version 2.2, Ebasco Services Incorporated, April 1988.

Table 6 (continued).

13. Demolish horizontal storage tank HAS-2.

14. Demolish storage tanks US-1 and 2.

15. Demolish horizontal storage tank HAS-3.

16. Demolish horizontal storage tank CS-1.

17. Demolish the fire protection deluge system over tank US-4 (200,000 gallons).

18. Strip polyurethane insulation from tank US-4 and dismantle.

19. Demolish the fire protection deluge system over tank US-3 (50,000 gallons).

20. Strip polyurethane insulation from tank US-3 and dismantle. Remove all above ground structural steel, pumps, and piping from the transfer pit.

21. Demolish and remove the concrete bermed area around tank US-3 and the concrete transfer pit. Backfill area to grade with noncontaminated soil.

22. Demolish and remove the concrete bermed area around tank US-4. Backfill area to grade with noncontaminated soil.

23. Remove miscellaneous concrete pads and structures: nitrogen pad, emergency eye wash pad, and the fire protection valve pit and outside debris. Backfill any remaining depressions with noncontaminated soil.

24. Demolish piping and 19 support stanchions connecting tanks US-3 and 4 to US-1 and 2. The stanchion foundation will be removed to a depth of 3 feet below the ground surface and backfilled with uncontaminated soil.

25. Demolish and remove the concrete berms around tanks HAS-1, 2, 3, and US-1 and 2. Backfill area to grade with noncontaminated soil.

26. Demolish and remove the concrete fire protection valve pit and backfill with noncontaminated soil.

27. Remove and dispose of 120 feet of railroad track and ties from the hydrazine blender pad. Remove the underlying drainage piping below the pad.

28. Demolish and remove the concrete slabs for Buildings 755, 868, and 759. Remove underlying drainage piping below these slabs.

Table 6 (continued).

29. Remove underground piping in the east and west areas. This includes drainage lines, potable water lines, fire protection lines, and the change house septic tank and leach field.

30. Remove buried conduits located in the east and west areas.

31. Remove above ground electrical conduits, poles and transformers located in the east and west areas.

32. Remove the pavement for the truck turnaround and other pavement in the west area.

33. Demolish and remove inground concrete tank or waste sump. Backfill area to grade with noncontaminated soil.

34. Demolish and remove the drum storage pad, with underlying piping and backfill to grade with noncontaminated soil.

35. Remove the interior chain-link fences around the east and west areas.

36. Remove the exterior barbed-wire fences around the east and west areas.

7.0 IRA PROCESS

For the HBSF IRA, the interim action process is as follows:

1. The Army requested EPA, Shell and the State of Colorado to assist in identifying on a preliminary basis any potentially applicable or relevant and appropriate Federal or State standards, requirements, limitations and criteria (ARARs).

2. The Army afforded the Department of Interior (DOI), the State, and other organizations an opportunity to participate, at the RMA Committee level, in the identification and selection of ARARs pertinent to this IRA. In this instance, the participation took the form of the Army's submitting an initial draft of this document to the RMA Committee members.

3. The Army prepared a draft HBSF IRA assessment that was submitted to the DOI, the State, and other organizations for review and comment. Comments were to be submitted up to 30 days after receipt of the draft assessment. After the close of the comment period and in consideration of the comments received, the Army prepared and transmitted a final assessment to the DOI, the State, and other organizations.

4. The Army shall then issue a proposed HBSF IRA Decision Document which shall be subject to a 30-day public comment period and supported by an administrative record. A public meeting is scheduled for mid-August in Denver, Colorado.

5. Promptly after the close of the comment period, the Army shall transmit to the DOI, the State, and other organizations a draft final HBSF IRA Decision Document.

6. Within 20 days of issuance of the draft final HBSF IRA Decision Document, an organization (or DOI where appropriate) may invoke Dispute Resolution.

7. After the close of the period for invoking Dispute Resolution (if Dispute Resolution is not invoked) or after the completion of Dispute Resolution (if invoked), the Army shall issue a final HBSF IRA Decision Document to the DOI, the State, and other organizations, and shall notify the public of the availability of the final HBSF IRA Decision Document with the supporting administrative record. Only preliminary design work for the IRA may be conducted prior to issuance of the final HBSF IRA Decision Document.

8. Thereafter, the HBSF IRA Decision Document will be subject to judicial review in accordance with Sections 113 and 121 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended, 42 U.S.C. Sections 9613 and 9621.

8.0 ARARs

8.1 ATTAINMENT OF ARARs

The interim action process reported to the Court on June 5, 1987 in United States v. Shell Oil Co. provides that interim response actions (including the HBSF IRA) shall, to the maximum extent practicable, attain applicable or relevant and appropriate Federal and State standards.

8.2 IDENTIFICATION AND SELECTION OF ARARs

By letter dated December 31, 1987, counsel for the Army requested that EPA, Shell and the State preliminarily identify in writing the potential ARARs that they believe may be pertinent to the HBSF IRA. EPA responded, no response was received from Shell, and the State responded but did not identify potential ARARs.

8.3 SELECTION OF ARARs AND DETERMINATION OF ARAR IMPACT

8.3.1 AMBIENT OR CHEMICAL-SPECIFIC ARARs

8.3.1.1 DESCRIPTION

Ambient or chemical-specific requirements set health or risk-based concentration limits or ranges in various environmental media for specific hazardous substances, pollutants or contaminants. Such ARARs set either protective cleanup levels for the chemicals of concern in the designated media, or indicate an appropriate level of discharge.

8.3.1.2 NEUTRALIZATION AND DISCHARGE OF WASTEWATER

Recent samples[1] of the subject wastewater indicate the presence of the following hazardous substances: hydrazine, MMH, UDMH, NDMA, methylene chloride, chloroform, 1,1-dichloroethane, 1,1-dichloroethylene, chloromethane, acetone, dimethylhydrazine formaldehyde, dimethyldisulfide and isiphorone.[2] The medium of concern is the wastewater.

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1 Draft Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment, Version 2.2, Ebasco Services Incorporated, April 1988, Table 2-5, page 2-28. Samples were taken from Tanks US-3 and US-4.

2 The presence of chlorinated compounds in the wastewater is probably the result of the use of calcium hypochlorite in rinse solutions applied to pipes and tanks and the historical practice of neutralizing wastewater with calcium hypochlorite.

Primary treatment of the hydrazine wastewater by ozone/UV light or hydrogen peroxide UV light will achieve technology based limits.[3] This treatment approach will also reduce the concentrations of chlorinated compounds present in the wastewater. Sampling of the wastewater prior to discharge to the sanitary sewer system will insure that treatment to technology based action levels has occurred. Neutralized wastewater will then be transported by the sewer system to the South Plants Wastewater Treatment Facility for secondary treatment prior to final discharge through the Arsenal's external outfall.

Treatment of the wastewater during the HBSF IRA is a final remedial action in the sense that after hazardous substances in the wastewater (medium of concern) are treated to identified action levels no further action is contemplated. Therefore, ARARs specifying cleanups levels (action levels) protective of human health and the environment, if pertinent, do need to be identified and applied. Health or risk based levels would afford the most protective standard. EPA Ambient Water Quality Criteria (AWQC) are the only health based standards which have been identified. Ambient Water Quality Criteria for NDMA identify an action level of 1.4 ppt at 10^{-6}.[4] However, AWQC are not considered applicable to this interim action since they do not establish any requirements. They are not considered relevant and appropriate since they are designed to protect individuals who are exposed through drinking this water, which is not an exposure present here. When developing a permanent remedy the factual context may be different.

Detection methods certified for use at the Arsenal can only identify NDMA concentrations at 200 ppt. Because the health based level (1.4 ppt) is far below detection technology limits (200 ppt), technology based action levels are the best which can be identifiably achieved. Therefore, the Army has identified the following technology based action levels as the pertinent standard:

Substance	Action Level
NDMA	200 ppt
Hydrazine	2.5 ppb[5]
MMH	20 ppb
UDMH	25 ppb

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3 Technology based limits are determined by the ability to detect the presence of the target chemical in wastewater samples. Currently, the Arsenal is certified to detect NDMA at 200 parts per trillion (ppt). Sampling and treatment focus on NDMA, because it is the most hazardous substance present in the wastewater, and because treatment to NDMA detection limits assures that the other substances (hydrazine, MMH, UDMH and chlorinated compounds) will be reduced to below their detection limits. Treatment to technology based limits is the best that can be achieved since health limits (1.4 ppt for NDMA at 10^{-6}) are far below detection limits (technology based limits).

4 No Ambient Water Quality Criteria for hydrazine, UDMH or MMH have been identified. However, since NDMA is the most hazardous, and also the most resistant to treatment, treatment of the wastewater to the action level for NDMA will assure neutralization of these other substances to below action levels.

5 ppb; parts per billion.

While the technology-based action levels described above are pertinent in this context, they are not applicable or relevant and appropriate, because they have never been formally enacted, promulgated or adopted by any legislative or administrative body.[6] Nevertheless, the technology based levels identified above will be employed here by the Army as action levels for the primary treatment of the wastewater at the HBSF. These levels are considered to be sufficiently protective of human health and the environment as the treatment system effluent will pass through the sanitary sewer treatment system and undergo additional natural oxidation when discharged to First Creek before flowing off the Arsenal.

8.3.1.3 REMOVAL OF DEMOLITION DEBRIS

Demolition of the HBSF constitutes a removal action. Since final remediation of soil and groundwater is beyond the scope of this interim action, ARARs identifying site-specific cleanup levels are neither applicable, nor relevant and appropriate in this instance.

8.3.2 LOCATION - SPECIFIC ARARs

8.3.2.1 DESCRIPTION

Location-specific requirements set restrictions on activities depending on the characteristics of the site or its immediate environment. These requirements function like action-specific requirements. Alternative remedial actions may be restricted or precluded depending on the location or characteristics of the site and the requirements that apply to it.

The HBSF IRA involves only the removal of existent facilities. No new buildings, production, treatment or storage facilities are to be erected in connection with this IRA. Therefore, no site-specific ARARs for the construction of new facilities have been identified.

A variety of wildlife can be found at the Arsenal. The proposed Consent Decree generally provides for the preservation and management of wildlife at the Arsenal, including endangered species, migratory birds and bald eagles. While the decree itself is not an ARAR, its provisions regarding the preservation of wildlife must be applied to the HBSF IRA. Additionally, provisions of the Endangered Species Act of 1973, 16 U.S.C. Section 1536 <u>et seq.</u>, must be incorporated into the HBSF IRA where site-specific conditions warrant such application.

The HBSF occupies a relatively flat area in an open field. No trees or other roost or perch sites for bald eagles have been identified in this area. Likewise, no standing liquid, pond or basin which might attract migratory waterfowl is located in this area. Further, no prairie dog colonies have been located in this area (an important factor since prairie dogs provide a prey base for the bald eagles). Given the absence of wildlife in the area and the unlikelihood of wildlife being impacted by the HBSF IRA , no action need be considered in this context.[7]

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[6] To be binding, Section 121(d) of CERCLA, 42 U.S.C. Section 9601 <u>et seq.</u>, requires Federal or State requirements to be legally applicable <u>or</u> relevant <u>and</u> appropriate.

[7] Information concerning wildlife has been verified with representatives of the U.S. Fish and Wildlife Service.

8.3.3 ACTION-SPECIFIC ARARs

8.3.3.1 DESCRIPTION

Action-specific ARARs set controls or restrictions on particular kinds of activities related to the management of hazardous substances, pollutants or contaminants. These action-specific requirements may specify particular performance levels, actions or technologies, as well as specific levels (or a methodology for setting specific levels) for discharges or residual chemicals.

The following warrant consideration as ARARs in connection with the HBSF IRA:

8.3.3.2 REMOVAL OF PCB CONTAMINATED TRANSFORMER STATUTORY AUTHORITY: TOXIC SUBSTANCES CONTROL ACT (TSCA) 15 U.S.C. SECTION 2601 <u>et seq.</u>

One of the five electrical transformers on-site at the HBSF contains PCB contaminated oil in the 50 ppm to 500 ppm range. Removal of this transformer (and the others that will be treated as if contaminated) and disposal of the contained oil, and associated waste generated during removal, must be in conformance with those requlations promulgated under TSCA, 15 U.S.C. Section 2601 <u>et seq.</u> The Army has preliminarily identified the following ARARs as applicable to the HBSF IRA:

(i) 40 C.F.R. Section 761.60(a)(2) -- Disposal of PCB-Contaminated Electrical Equipment, mineral oil.

(ii) 40 C.F.R. Section 761.60(b)(4) -- Disposal Requirements. Any PCB-Contaminated Electrical Equipment must be disposed of in accordance with this regulation. The transformer must be drained of all free flowing liquid. The liquid must be disposed of pursuant to 40 C.F.R. Section 761.60(a)(2) or (3).

All drained PCB liquids, if incinerated, must be destroyed in an incinerator that complies with 40 C.F.R. Section 761.70.

(iii) 40 C.F.R. Section 761.65 -- Storage For Disposal. Generally, PCBs in concentrations of 50 ppm to 500 ppm must be stored in a structure that prevents rainwater from reaching the stored items. The floor and curbing of the structure must be impervious and able to contain a spill equal to twice the volume of the largest container or alternatively, contain at least 25 percent of the total volume of all stored PCBs. 40 C.F.R. Section 761.65(c)(1) provides a limited exception to this requirement for items stored for up to 30 days after removal. In any event all containers used to store PCBs must be constructed in conformance with the Shipping Container Specifications of the Department of Transportation, 49 C.F.R. Part 178.

(iv) 40 C.F.R. Section 761.79 -- Decontamination. Any container used to store PCBs, or equipment which has come into contact with PCBs, must be decontaminated by flushing with solvent in accordance with this section. Solvents used to flush equipment and containers shall be disposed of in accordance with 40 C.F.R. Section 761.61(a)(4).

(v) 40 C.F.R. Sections 761.60 and 761.65 -- Transportation. Transportation of PCBs must be done in accordance with the provisions of these sections. Additionally, transportation methods must conform to Department of Transportation hazardous material regulations 49 C.F.R. Section 173.510. For reasons discussed elsewhere within this document, RCRA regulations are not applicable to this IRA. However, recordkeeping and manifest requirements specified in 40 C.F.R. Parts 262 and 263 are relevant and appropriate with regard to the transportation of PCB liquids and contaminated transformers.

(vi) 40 C.F.R. Section 761.180(a) -- Recordkeeping Requirements.

In order to comply with the above regulations, the HBSF IRA shall require all containers and equipment exposed to PCBs to be properly labeled, as appropriate. Liquid PCB shall be drained from the suspect transformer and placed in a DOT approved container. The transformer itself shall be rinsed with solvent in accordance with specified procedures and all liquid used in the rinse process shall be collected and properly containerized. All containerized PCB liquid shall be disposed of in accordance with 40 C.F.R. Section 761.60(a)(2) or (3). Any incineration of PCBs will be accomplished by shipment to an approved incinerator facility. The empty, flushed, transformer shall be disposed of at an approved off-site disposal facility.

8.3.3.3 REMOVAL OF ASBESTOS INSULATION STATUTORY AUTHORITY: CLEAN AIR ACT, AS AMENDED, 42 U.S.C. SECTIONS 7412 and 7601 (a)

The HBSF IRA will involve the removal and disposal of materials suspected of containing friable asbestos. Those materials are: above ground piping, insulation on equipment, building insulation and insulation on pipes within buildings.[8] Federal regulations promulgated to Sections 112 and 301(a) of the Clean Air Act, 42 U.S.C. Sections 7412 and 7601(a), as amended, contain requlations which are applicable[9] to this IRA. The Army has preliminarily identified the following Federal regulations as applicable ARARs:

(i) 40 C.F.R. Section 61.145 -- Standard for demolition and renovation: Applicability;

(ii) 40 C.F.R. Section 61.146 -- Standard for demolition and renovation: Notification requirements;

(iii) 40 C.F.R. Section 61.147 -- Standard for demolition and renovation: Procedures for asbestos emission control;

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[8] Asbestos insulation, along with other demolition debris, is assumed to be contaminated with hydrazine, NDMA, UDMH and MMH.

[9] The State of Colorado has been delegated the authority under the Clean Air Act, 42 U.S.C. Section 7401 <u>et seq.</u>, to administer a State NESHAPS program. State regulations pertaining to the control of hazardous air pollutants are contained in 5 CCR 1001-10, Part II, Regulation 8. Parallel Federal regulations, 40 C.F.R., Part 61, Subpart M, are as, or more stringent, than the Colorado regulations and, therefore, have been incorporated herein as applicable ARARs.

(iv) 40 C.F.R. Section 61.152 -- Standard for waste disposal for manufacturing, demolition, renovation, spraying, and fabricating operations;

(v) 40 C.F.R. Section 61.152 -- Reporting;

(vi) 40 C.F.R. Section 61.156 -- Active waste disposal sites.

Generally, these regulations require the following procedures: 40 C.F.R. Section 61.145 applies the criteria outlined in Sections 61.146 and 61.147 to sites if the amount of friable asbestos exceeds 260 linear feet of pipe insulation. The volume of asbestos insulated materials to be removed during the HBSF IRA exceeds 260 linear feet. Section 61.146 requires the owner or operator to notify the EPA Administrator of the removal and proscribes the timing and contents of the notice. Section 61.147 specifies procedures for minimizing asbestos emissions during demolition. It requires friable asbestos bearing material to be removed prior to demolition unless it is encased in concrete or similar material and is wetted during demolition. Otherwise, asbestos bearing material is to be removed in units or sections prior to demolition. If sections are removed, further stripping of the asbestos is to be done while the material is sufficiently wet to prevent release of particulates. Alternatively, stripping can be done in a closed facility where the air is filtered to prevent a release to the outdoors. Section 61.152 specifies disposal standards. Those standards require that the removed asbestos be; (a) mixed with water, (b) compressed into nonfriable forms or, (c) disposed of in a manner otherwise approved by the EPA Administrator. During the removal, precautions must be taken to prevent any visible emissions to the outside air resulting from the collection, stripping and wetting operations. Removed asbestos must be deposited in an approved waste disposal site which conforms with the requirements of 40 C.F.R. Section 61.156.

The HBSF IRA will attain compliance with these ARARs. The notice provision of 40 C.F.R. Section 61.146 are procedural and under Section 121(e) of CERCLA, 42 U.S.C. 9601 et seq., as amended, are not binding. Nonetheless, the ARAR review process itself will provide equivalent information.

Removal of friable asbestos before demolition, except in specific circumstances, is required under 40 C.F.R. Section 61.147. The HBSF IRA hazard abatement plan specifies that friable asbestos will be removed before facility demolition commences.

Under Section 61.147 friable asbestos is to be wetted sufficiently so as to prevent emission of particulates. As previously noted, some of the material to be removed is likely to be contaminated with hazardous substances. The addition of water to hazardous substances prior to landfill disposal is generally prohibited. Additionally, wetting prior to removal may facilitate the migration of the hazardous substances into soil, surface water and groundwater. To avoid these consequences, the HBSF IRA proposes the following method of dry asbestos removal. Asbestos insulated pipes and equipment will be removed by breaking it into units or segments.[10] Where

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[10] Breaking as opposed to cutting asbestos insulation minimizes particulate emissions.

asbestos insulation must be stripped from pipe or equipment (which is either in-place, or has been removed in segments), air-tight plastic bags with built-in work gloves will be placed over the work area and sealed prior to insulation stripping. When stripping is complete, or as bags become full, the bags will be sealed for disposal. This method should result in a reduction of particle emissions equivalent to that achieved by wetting before removal.

40 C.F.R. Section 61.152 specifies conditions which attach to asbestos disposal. In accordance with this section, all containers used for disposal will be properly labeled. This section also specifies that in preparation for disposal, friable asbestos is to be wetted or reduced by compression into a nonfriable form. Alternative methods which obtain the same results are permissible. Containerization in the plastic bags during the removal of the asbestos will attain the desired result of minimizing particulate emission during the disposal process.

40 C.F.R. Section 61.156 specifies the type of facility at which asbestos can be disposed and regulates the disposal process. Asbestos bearing demolition debris generated by the HBSF IRA will be disposed of at an off-site facility which satisfies the criteria enumerated in this section.

Pursuant to Sections 1109 and 301(a) of the Clean Air Act, as amended, 42 U.S.C. Sections 7409 and 7601(a), additional regulations regarding national primary and secondary ambient air quality standards for particulate matter have been promulgated at 40 C.F.R. Part 50. These requirements are neither applicable, nor relevant and appropriate to the HBSF IRA since "ambient air" is defined therein, as air, "to which the general public has access." The general public does not have access to the Arsenal. Moreover, the site of the HBSF IRA is sufficiently removed from the public as to make application of such standards unwarranted. Demolition practices during the HBSF IRA will incorporate procedures to suppress dust and particle emissions where reasonable and feasible.

8.3.3.4 TRANSPORTATION OF HAZARDOUS SUBSTANCES TO OFF-SITE DISPOSAL FACILITIES STATUTORY AUTHORITY: SECTIONS 1006, 2002, 3002, 3003, 3004, 3005, and 3017 OF THE SOLID WASTE DISPOSAL ACT, AS AMENDED BY THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA), 42 U.S.C. SECTIONS 6906, 6912, 6922, 6923, 6924, 6925 AND 6937

As previously noted, RCRA does not apply to the HBSF IRA, because it fails to meet the requisite jurisdictional requirements. Under the provisions of CERCLA Section 121(d), however, the Army has preliminarily identified substantive regulations found at 40 C.F.R. Part 262 which were promulgated pursuant to the above referenced sections of RCRA as relevant and appropriate ARARs.[11]

(i) 40 C.F.R. Section 262.20, Subpart B -- Manifest; General Requirements;

(ii) 40 C.F.R. Section 262.30, Subpart C -- Pre-Transport Requirements;

(iii) 40 C.F.R. Section 262.40, Subpart D -- Recordkeeping and Reporting.

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11 State regulations found at 6 CCR 1007-3, Subparts B, C and D contain analogous regulations.

40 C.F.R. Section 262.20 essentially provides for a manifest that identifies the nature and volume of hazardous waste to be transported, the generator responsible, the transporter and the designated disposal facility. 40 C.F.R. Section 262.23 describes the use of the manifest.

40 C.F.R. Section 262.40 sets forth criteria which describes how the generator must retain manifest records. 40 C.F.R. Subpart C, Sections 262.30 through 262.33 address packaging, labeling, marking and placarding requirements which are prerequisites to the transportation of hazardous waste. These sections incorporate by reference Department of Transportation Regulations found at 49 C.F.R. Parts 172, 173, 178 and 179. The HBSF IRA shall attain compliance with the identified ARARs for those hazardous substances, pollutants and contaminants to be disposed of in off-site facilities as follows: All shipments of hazardous waste from the site will be documented in accordance with the above referenced sections of 40 C.F.R. Part 262, Subparts B and D recordkeeping requirements. Transportation of the hazardous waste will be accomplished by retaining an authorized transporter. Twenty-five-ton rear dump trailers or flatbed trailers will be used.[12] Trailers may move over public roads or via railcar. Prior to loading, waste, excluding asbestos, will be tightly packed to reduce volume. Trailers will be double-lined with 3 to 10 mil polyethylene sheets which will be used to wrap the solid wastes. Tarps will then be placed over the liners to both protect the liners and to further isolate the wastes during transportation. Asbestos will be bagged, sealed, and placed in steel drums. All wastes will only be transported to permitted hazardous waste landfills.

8.3.3.5 GENERAL CONSTRUCTION ACTIVITIES

The following performance, design or other action-specific State ARARs have been preliminarily identified by the Army as relevant and appropriate to this portion of the HBSF IRA and are more stringent than any applicable or relevant and appropriate Federal standard, requirement, criterion or limitation:

(i) Colorado Air Pollution Control Commission Regulation No. 1, 5 CCR 100-3, Part III(D)(2)(b), "Construction Activities":

a. Applicability - Attainment and Nonattainment Areas

b. General Requirement - Any owner or operator engaged in cleaning or leveling of land or owner or operator of land that has been cleared of greater than one acre in nonattainment areas from which fugitive particulate emissions will be emitted shall be required to use all available and practical methods which are technologically feasible and economically reasonable in order to minimize such emissions in accordance with the requirements of Section III.D. of this regulation.

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[12] No more than 44,000 pounds of waste would be placed in a single trailer in order to comply with the State of Colorado Department of Transportation gross vehicle weight limitations for the transportation of hazardous waste.

c. Applicable Emission Limitation Guideline - Both the 20 percent opacity and the no off-property transport emission limitation guidelines shall apply to construction activities; except that with respect to sources or activities associated with construction for which there are separate requirements set forth in this regulation, the emission limitation guidelines there specified as applicable to such sources and activities shall be evaluated for compliance with the requirements of Section III.D.2 of this regulation. (Cross Reference: Subsections e. and f. of Section III.D.2 of this regulation.)

d. Control Measures and Operating Procedures - Control measures or operational procedures to be employed may include, but are not necessarily limited to, planting vegetation cover, providing synthetic cover, watering, chemical stabilization, furrows, compacting, minimizing disturbed area in the winter, wind breaks and other methods or techniques.

(ii) Colorado Ambient Air Quality Standards, 5 CCR 1001-14, Air Quality Regulation A, "Diesel-Powered Vehicle Emission Standards for Visible Pollutants":

a. No person shall emit or cause to be emitted into the atmosphere from any diesel-powered vehicle any air contaminant, for a period greater than 10 consecutive seconds, which is of such a shade or density as to obscure an observer's vision to a degree in excess of 40 percent opacity, with the exception of Subpart b below:

b. No person shall emit or caused to be emitted into the atmosphere from any naturally aspirated diesel-powered vehicle of over 8,500 lbs gross vehicle weight rating operated above 7,000 feet (mean sea level), any air contaminant for a period greater than 10 consecutive seconds, which is of such a shade or density as to obscure an observer's vision to a degree in excess of 50 percent opacity.

c. Diesel-powered vehicles exceeding these requirements shall be exempt for a period of 10 minutes, if the emissions are a direct result of a cold engine start-up and provided the vehicle is in a stationary position.

d. This standard shall apply to motor vehicles intended, designed and manufactured primarily for use in carrying passengers or cargo on roads, streets and highways.

(iii) Colorado Noise Abatement Statute, C.R.S. Section 25-12-103:

a. Every activity to which this article is applicable shall be conducted in a manner so that any noise produced is not objectionable due to intermittence, beat frequency, or shrillness. Sound levels of noise radiating from a property line at a distance of 25 feet or more, therefrom, in excess of the db(A) established for the following time periods and zones shall constitute prima facie evidence that such noise is a public nuisance:

Zone	7:00 a.m. to next 7:00 p.m.	7:00 p.m. to next 7:00 a.m.
Residential	55 db(A)	50 db(A)
Commercial	60 db(A)	55 db(A)
Light Industrial	70 db(A)	65 db(A)
Industrial	80 db(A)	75 db(A)

b. In the hours between 7:00 a.m. and the next 7:00 p.m., the noise levels permitted in Subpart a of this section may be increased by 10 db(A) for a period of not to exceed 15 minutes in any 1-hour period.

c. Periodic, impulsive, or shrill noises shall be considered a public nuisance when such noises are at a sound level of 5 db(A) less than those listed in Subpart a of this section.

d. Construction projects shall be subject to the maximum permissible noise levels specified for industrial zones for the period within which construction is to be completed pursuant to any applicable construction permit issued by proper authority or, if no time limitation is imposed, for a reasonable period of time for completion of project.

e. For the purposes of this article, measurements with sound level meters shall be made when the wind velocity at the time and place of such measurement is not more than 5 miles per hour.

f. In all sound level measurements, consideration shall be given to the effect of the ambient noise of the environment from all sources at the time and place of such sound level measurement.

8.3.3.6 REGULATIONS PROTECTIVE TO WORKERS

Because of the possibility that workers employed to conduct the HBSF IRA may be exposed to airborne contaminants, air monitoring at the site will be required during the duration of the action. The Army has preliminarily identified the following OSHA Permissible Exposure Limits (PELs) as pertinent to this action. Should monitoring detect the presence of substances above these limits, protective action, including, but not limited to, breathing apparatus and protective clothing, will be employed.

Substance	Exposure Limit
Hydrazine	8-hour TWA[13]: 0.1 ppm (skin)
NDMA	No Permissible Contact Level
Methylene chloride	8-hour TWA: 500 ppm
Chloroform	CL[14] 50 ppm
1,1- dichloroethane	8-hour TWA: 200 ppm
1,1- dichloroethylene	8-hour TWA: 5 ppm

Because of the absolute prohibition on worker contact with NDMA, level B protective garb will be worn by all workers in areas where NDMA is detected.

13 TWA; Time Weighted Average.

14 CL; Ceiling Limit.

9.0 SCHEDULE

The HBSF IRA Implementation Document will be completed July 18, 1989. This milestone for the HBSF IRA has been developed based upon the draft assessment document and the assumption that no dispute resolution will occur. If events occur which necessitate a schedule change or extension, the change will be incorporated in accordance with the discussion in Section XVIII of the RI/FS Process Document.

10.0 CONSISTENCY WITH THE FINAL REMEDIAL ACTION

The HBSF IRA, to consist of treatment and disposal of stored wastewater and dismantlement and disposal of above ground structures and equipment, will be conducted by the U.S. Army Program Manager's Office and will be consistent with any final remedial action selected for the HBSF.

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